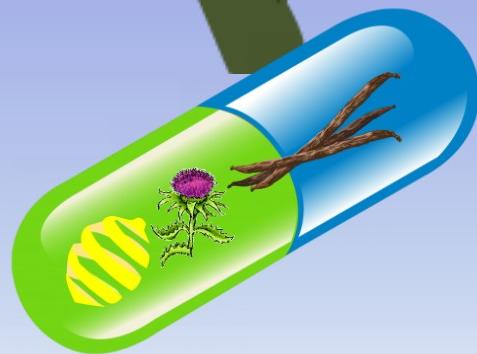


# Pharmacognosy II

## Fruits Summary



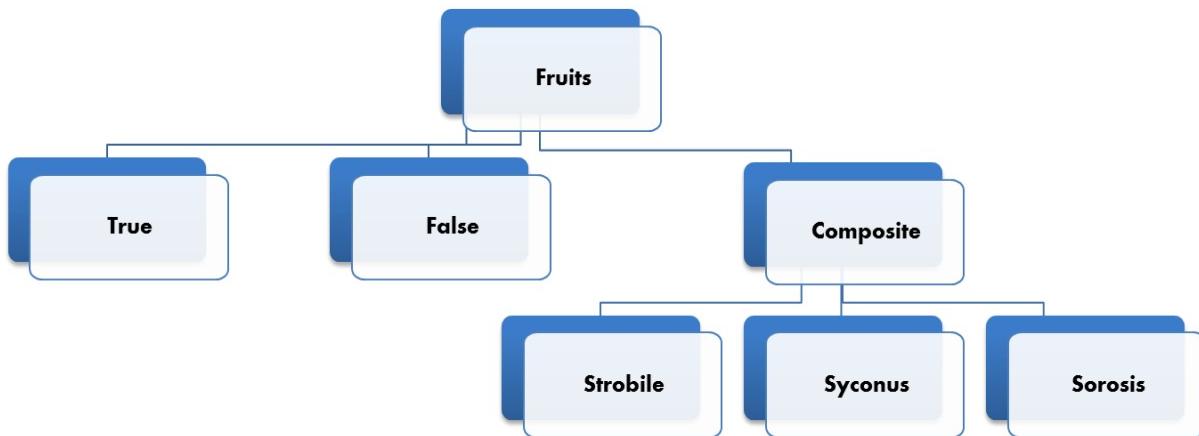
# Fruits

## Definition:

Plant organs resulting from fertilization of mature gynoecium (Ovary + Style + Stigma)

## Types of fruits

- (1) False fruits: Resulting from gynoecium + receptacle e.g Pome fruits (apple)
- (2) True fruits: Resulting from gynoecium only e.g. Citrus
- (3) Compositous fruits: Resulting from fertilization of flowers on an inflorescence.



## True fruits are classified into:

- (1) Simple fruits: Resulting from single ovary on a flower on one pedicel

### (A) Dry fruits

- 1- Dehiscent fruits: Open and release their seeds e.g

- Legume: splits along dorsal and ventral suture (senna pods),
- Siliqua: with a false septa (black mustard),
- Follicles (open by ventral suture),
- Capsules open by loculicidal valves e.g cardamom,
- Pyxis e.g hyoscyamus by pores e.g poppy seeds)

- 2- Indehiscent fruits Don not open not release its seeds e.g.

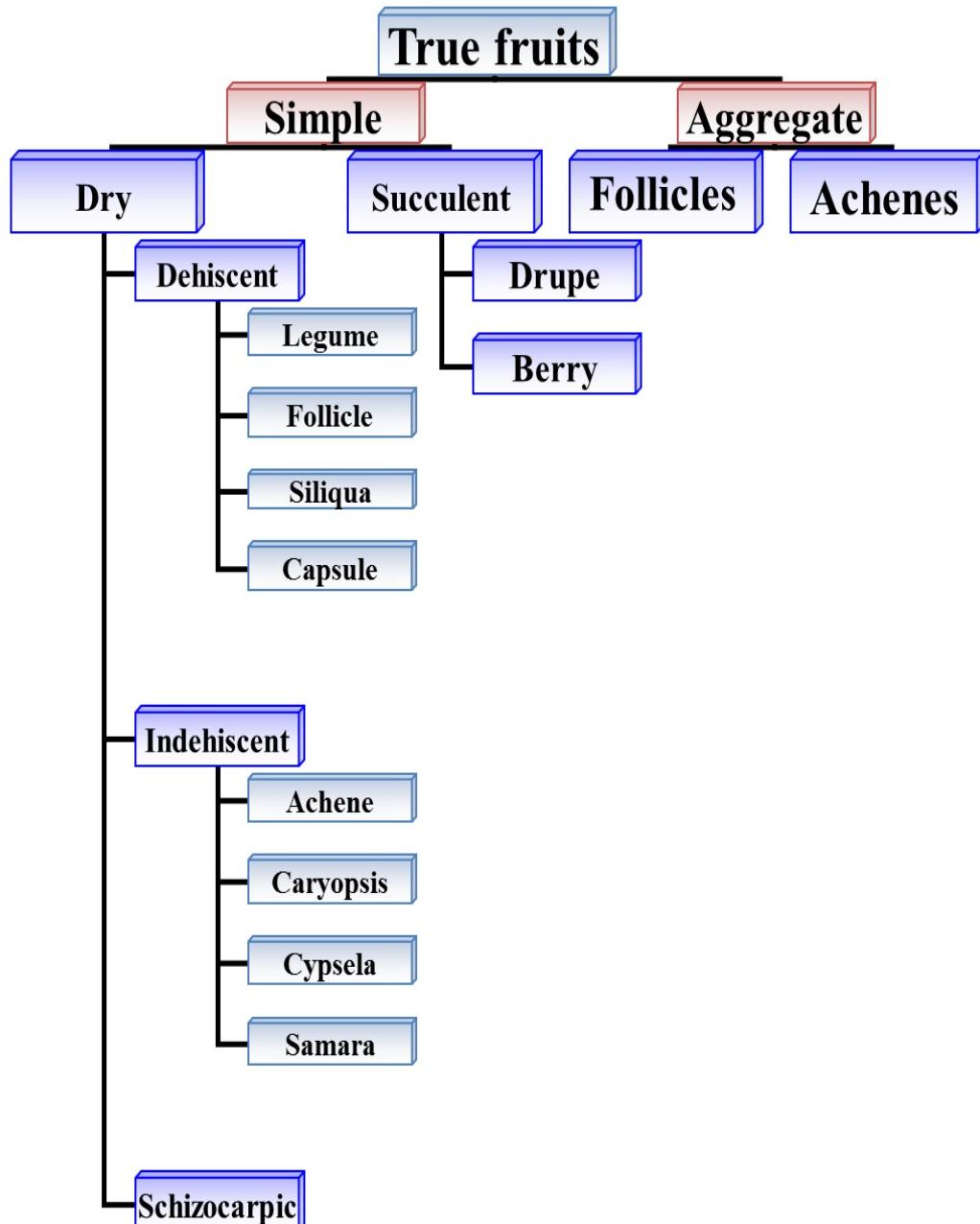
- Caryopsis: Fusion of the testa with endocarp e.g. wheat grains.
- Achene: Testa free pericarp e.g. figs, strawberry.
- Samara: Winged memberane from pericarp
- Nut: Like achene but bigger
- Cypsela: Pericarp and testa are free
- Lomentum: Modified indehescient legumes (e.g pea nut)

- 3- Schizocarpic fruits (Cremocarp): splitting into two parts each part is called mericarp each mericarp contains its seeds e.g umbelliferous fruits fennel and anise.

## (B) Succulent fruits (fleshy)

- Berry succulent with fleshy endocarp classified into:
  - Hesperidium e.g Citrus, Colocynth and Capsicum
  - Pepo: Pumpkin
- Drupe succulent fleshy mesocarp, hard endocarp e.g black pepper

N.B:- Parthenocarpic fruits fruits with no seeds e.g banana



(ii) Aggregate fruits: From 3-5 fruits on the same pedicle e.g. aggregate of follicles  
Star anise

Compositous fruits: Resulting from fertilization of flowers on inflorescence e.g.

- Srobile: large number of fruits on fleshy receptacle e.g. strawberry

- **Syconus:** large number of achene fruits inside fleshy receptacle e.g. figs
- **Sorosis:** large number of fruits on a spike type inflorescence e.g. long pepper

## Histology of fruits

### (A) Pericarp (3 layers)

#### (1) Epicarp

One layer of epidermal cells may be polygonal or isodiametric, with straight anti clinal walls, smooth cuticle (fennel) or striated cuticle (anise) or papillose (*Ammi majus*) with paracytic stomata (senna pods) anomocytic stomata (fennel), with hairs (anise, senna pods), or without hairs (coco-cynth), with content prisms (Black pepper, *Ammi majus*) or without content (Fennel, *Capsicum*)

#### (2) Mesocarp

\* Consists of Parenchymatous cells interrupted by one or more of the following layers:

- Collenchyma e.g under primary ridges of umbelliferous fruits
- Vascular bundles e.g under primary ridges of umbelliferous fruits, also V.B in *capsicum*
- Vitreae (schizogenous ducts) in umbelliferous fruits, oil glands e.g lemon peel, orange peel

\* Innermost layer of the mesocarp may be diagnostic for each fruit e.g.:

- Giant cells e.g *Capsicum*.
- Porous layer e.g *Ammi visnaga*
- Beaded e.g Coriander
- Parenchyma contain prisms of Ca. oxalate forming crystal sheath (senna)

#### (3) Endocarp: May be diagnostic for each fruit e.g.

- Parquetry arranged in different planes (fennel, coriander, *Ammi majus*)
- Non-parquetry arranged in one plane (anise),
- Indistinct parquetry (*Ammi visnaga*),
- Sclerides (*capsicum*).
- Placenta cells: Dissipation

### (B) Seed (Testa and kernel)

**(A) Testa** (outer integument 1 or 2) it consists typically of 5 layers those are

#### (1) Epidermis (characteristic for each seed)

Filled with brown content e.g. umbelliferous fruits

Filled with mucilage e.g. black mustard, linseed

Prosenchymatous e.g. cardamom

Palisade like e.g. foenugreek

Sclerenchymatous e.g. *capsicum*, *datura*, *hyoscyamus*

Sclerides carrying lignified hairs e.g. *nux vomica*, *strophantus*

#### (2) Hypodermis (characteristic for each seed)

It may be collenchyma (linseed), collapsed parenchyma (*Nux vomica*) or basket like (Foenugreek)

(3) **Sclerieds** it may be present or absent (characteristic for each seed)

With funnel shaped lumen and silica nodule (cardamom)

Unequal in length and thickning (black mustard)

Unequal in thickning (linseed)

(4) **Nutritive layer** (Collapsed parenchyma containing remains of reserved food materials e.g starch,oil droplets,aleurene layer )

(5) **Pigment layer** (may be present as in black mustard, linseed or absent as in white mustard )

### (B) Kernal (Perisperm + endosperm + embryo)

(1) **Perisperm**: may be present, polygonal cells with straight anticlinal walls filled with starch grains like cardamom. Or may be absent like linseed.

(2) **Endosperm**: may be present, polygonal cells with straight anticlinal walls filled with aleurene grains and oil droplets (albuminous seeds e.g linseed ) or absent (exalbuminous seeds e.g black mustard)

(3) **Embryo**: present as small polygonal cells with thick straight anticlinal walls filled with aleurone grains and oil droplets.

# Official Fruits

DRUG	ORIGIN	KEY ELEMENT, TEST	A.C., USES
Fennel الشمر	<ul style="list-style-type: none"> <li><input type="checkbox"/> Dried ripe fruits of <i>Foeniculum vulgare</i> F. Umbelliferae (F. Apiaceae)</li> <li><input type="checkbox"/> <i>Foenum</i> = Hay <i>cullum</i> = fire</li> <li><input type="checkbox"/> <i>Vulgare</i> = uncultivated</li> <li><input type="checkbox"/> <i>Umbelliferae</i> = umbel shaped</li> <li><input type="checkbox"/> <i>Apiaceae</i> from <i>Apis</i> = bees</li> <li><input type="checkbox"/> Contraindicated in pregnancy</li> </ul>	<ul style="list-style-type: none"> <li>➤ Epidermal cells with anomocytic stomata + Simple vittae + reticulate parenchyma (lignified) + parquetry endocarp</li> <li>➤ Sudan III gives Red colour</li> <li>➤ Adulterants: {Exhausted fennel} detected by low % V.O. - Sink in water - If rubbed between 2 fingers it will leave the artificial colour</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> V.O (Anethole + fenchone + Estragol)</li> <li><input type="checkbox"/> Flavonoids (Kaempferol.)</li> <li><input type="checkbox"/> Antiflatulant</li> <li><input type="checkbox"/> Carminative</li> <li><input type="checkbox"/> Renal colic</li> <li><input type="checkbox"/> Lactagogue</li> <li><input type="checkbox"/> Anti-Inflammat.</li> </ul>
Anise الينسون	<ul style="list-style-type: none"> <li><input type="checkbox"/> Dried ripe fruits of <i>Pimpinella anisum</i> F. Umbelliferae</li> </ul>	<ul style="list-style-type: none"> <li>➤ Epidermal cells with anisocytic stomata + striated cuticle + Branched vittae + non Parquetry endocarp + non glandular unicellular hair with warty cuticle</li> <li>➤ Sudan III gives red colour</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Volatile oils (Anethole + Estragole)</li> <li><input type="checkbox"/> Antispasmodic for babies</li> <li><input type="checkbox"/> Sedative</li> <li><input type="checkbox"/> Secretolytic</li> <li><input type="checkbox"/> carminative</li> <li><input type="checkbox"/> Cough</li> <li><input type="checkbox"/> Lactagogue</li> </ul>
Star anise Chinese Star Anise البنسون التجمي	<ul style="list-style-type: none"> <li><input type="checkbox"/> Dried ripe fruits of <i>Illicium verum</i> F. schizandraceae (old name magnoliaceae)</li> </ul>	<ul style="list-style-type: none"> <li>➤ <i>Illicium</i> = illucere = allurement fragrance</li> <li>➤ <i>Verum</i> = true</li> <li>➤ Schizein = to cleave</li> <li>➤ andros = cleft anther cells.</li> <li>➤ magnoliaceae = Pierre Magnol</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> V.O {mainly anethole}</li> <li><input type="checkbox"/> Carminative, antiflatulant</li> <li><input type="checkbox"/> Anti-gripping</li> </ul>

DRUG	ORIGIN	KEY ELEMENT, TEST	A.C., USES
<b>Coriander</b> ثمار الكروبرة	<ul style="list-style-type: none"> <li><input type="checkbox"/> Dried ripe fruits of <i>Coriandrum sativum</i> F. Umbelliferae</li> <li><input type="checkbox"/> <i>Coriandrum</i> = korios = bugs odour</li> <li><input type="checkbox"/> <i>sativum</i> = cultivated</li> <li><input type="checkbox"/> Coelospermous endosperm</li> </ul>	<ul style="list-style-type: none"> <li>➤ Epidermal cells with beaded anticlinal walls and anomocytic stomata + Simple damaged vittae + wavy crossed fibres + pitted innermost layer of mesocarp + parquetry endocarp</li> <li>➤ Sudan III red</li> <li>➤ Adultrants: exhausted coriander and Bombay coriander {Low % V.O.}</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Condiment</li> <li><input type="checkbox"/> Antiflatulant</li> <li><input type="checkbox"/> Antispasmodic in laxative preparations</li> <li><input type="checkbox"/> V.O {mainly linool}</li> <li><input type="checkbox"/> Flavonoids</li> </ul>
<b>Ammi visnaga</b> <b>Toothpick</b> الخلة البليدي	<ul style="list-style-type: none"> <li><input type="checkbox"/> Dried ripe fruits of <i>Ammi visnaga</i> F.</li> <li><input type="checkbox"/> Umbelliferae</li> <li><input type="checkbox"/> <i>Ammi</i> = Ammos = Sand</li> <li><input type="checkbox"/> <i>Visnaga</i> = bi-pointed Stylopod</li> <li><input type="checkbox"/> (Bitter taste - Inferior ovary - reflexed carpophore - anatropus ovule - Apical placentation - raphe - vittae - orthospermus endosperm - lacuna over V.B.)</li> </ul>	<ul style="list-style-type: none"> <li>➤ Porous innermost layer of mesocarp + simple vittae + indistinct parquetry endocarp</li> <li>➤ Water extract + KOH pellets Blood red colour due to Khellin</li> <li>➤ Alcoholic extract + Con H<sub>2</sub>SO<sub>4</sub> Lemon Yellow due to pyranocoumarins</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Furanochromones (Khellin - visnagin)</li> <li><input type="checkbox"/> Pyranocoumarins (Visnadin - samidin)</li> <li><input type="checkbox"/> Renal colic - kidney Stones - Angina - Asthma - Hypertension</li> </ul>
<b>Ammi majus</b> الخلة البري	<ul style="list-style-type: none"> <li><input type="checkbox"/> Dried ripe fruits of <i>Ammi majus</i> F.</li> <li><input type="checkbox"/> Umbelliferae</li> <li><input type="checkbox"/> <i>Ammi</i> = Ammos = Sand</li> <li><input type="checkbox"/> <i>majus</i> = major</li> </ul>	<ul style="list-style-type: none"> <li>➤ Parquetry endocarp + Papillosed epidermal cells striated with anomocytic stomata + prisms of Ca oxalate</li> <li>➤ Alcoholic extract under UV blue fluorescence</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Furanochromones (Xanthotoxin, Bergaptin)</li> <li><input type="checkbox"/> Leukoderma,</li> <li><input type="checkbox"/> Vitiligo</li> <li><input type="checkbox"/> Alopecia</li> </ul>
<b>Capsicum Cayenne</b> الشطة	<ul style="list-style-type: none"> <li><input type="checkbox"/> Dried ripe fruits of <i>Capsicum annum</i> var. minimum F. Solanaceae</li> </ul>	<ul style="list-style-type: none"> <li>➤ Lignified gut shaped endocarp, red oil droplets, innermost of mesocarp {Giant cells}</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Capsaicine phenolic alkaloid, carotenes and F.O</li> <li><input type="checkbox"/> Counter irritant</li> <li><input type="checkbox"/> Antirheumatic</li> <li><input type="checkbox"/> Acute rheumatism</li> <li><input type="checkbox"/> Lumbago</li> <li><input type="checkbox"/> Stomachic</li> <li><input type="checkbox"/> Fat burner</li> </ul>

من الطعام الحار **Cayenne**  
 *Capsicum* = caps = box  
 *annum* = annual  
 Solanaceae = Sun rays

**Capsicum Cayenne**  
الشطة

DRUG	ORIGIN	KEY ELEMENT, TEST	A.C , USES
<b>Colocynth Bitter apple</b> <small>الجحظل</small>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Dried unripe but fully grown fruits of <i>Citrullus colocynthis</i> F. cucurbitaceae Deprived from its rind and seeds</li> <li><input type="checkbox"/> <i>Citrullus</i> = <i>citrillus</i> = cucumber</li> <li><input type="checkbox"/> Greek <i>koloKyntis</i> = bitter gourd</li> <li><input type="checkbox"/> <i>Cucurbitaceae</i> = <i>cucurbita</i> = gourd</li> <li><input type="checkbox"/> unripe but fully grown to make peeling easy</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Pitthy Parenchyma + laticeferous ducts + oil droplets</li> <li>&gt; Mayer's test yellowish white P.P.+ 80% <math>H_2SO_4</math> orange red</li> <li>&gt; Adultrants: seeds {high % oils}, rind {high % sclerieds - low % active constituents}</li> <li>&gt; *Mayer's test yellowish white P.P.+ 80% <math>H_2SO_4</math> orange red</li> <li>&gt; Adultrants: seeds {high % oils}, rind {high % sclerieds - low % active constituents}</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> {Cucurbitichns}</li> <li><input type="checkbox"/> Steroidal saponins</li> <li><input type="checkbox"/> Cologynthine Alkaloid</li> <li><input type="checkbox"/> Resin</li> <li><input type="checkbox"/> <b>Hydrogogue</b></li> <li><input type="checkbox"/> <b>cathartic,</b></li> <li><input type="checkbox"/> <b>Cytotoxic -</b></li> <li><input type="checkbox"/> <b>Anticancer</b></li> <li><input type="checkbox"/> <b>Anti-rheumatic</b></li> </ul>
<b>Senna pods</b> <small>ثمار السنّا</small>		<ul style="list-style-type: none"> <li><input type="checkbox"/> Dried ripe fruits of <i>Cassia acutifolia</i> and <i>Cassia angustifolia</i> F. leguminosae (Fabaceae)</li> <li><input type="checkbox"/> New name {Dried ripe fruits of <i>Cassia alexandrina</i> F. leguminosae (Fabaceae)}</li> </ul>	<ul style="list-style-type: none"> <li>&gt; Straight crossed fibers with prisms of Ca oxalate + non glandular hairs with warty cuticle.</li> <li>&gt; Modified Bornträger's test red colour in aqueous Ammonical alkaline layer {Test for dianthrones Or sennosides}</li> <li><input type="checkbox"/> <b>(laxitive in acute constipation)</b></li> <li><input type="checkbox"/> <b>For short time</b></li> <li><input type="checkbox"/> <b>Anal fissures</b></li> <li><input type="checkbox"/> <b>Weight loss</b></li> <li>&gt; Contraindication: Intestinal Obstructions - Heart disease</li> </ul>

# Non-official Fruits

DRUG	ORIGIN	KEY ELEMENT, TEST	A.C , USES
Bitter orange peel فشر النارنج	<ul style="list-style-type: none"> <li>➢ 2 rows of oil glands</li> <li>➢ KOH {yellow colour}</li> <li>➢ <b>Histochemical test</b></li> <li>➢ Conc HCl {green colour}</li> <li>➢ <b>Histochemical test</b></li> </ul> <p>□ Dried rind of <i>Citrus aurantium</i> var. amara Family rutaceae</p> <p>□ <i>Citrus</i> = citron tree</p> <p>□ <i>aurantium</i> = aura = gold</p>	<ul style="list-style-type: none"> <li>➢ Bitter orange contains Synephrine (ephedrine like compound block satiety center in the brain) so you will not feel hungry and you will not eat. It also contains pectins which act as dietary fibre and swell by absorption of water also you will feel full and you will not eat so you will loose weight.</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> V.O,</li> <li><input type="checkbox"/> Bitter principles aurantiomarin</li> <li><input type="checkbox"/> Flavonoid hesperidin</li> <li><input type="checkbox"/> Synephrine, tyramine, pectins and Vit.B</li> <li><input checked="" type="checkbox"/> Bitter tonic</li> <li><input checked="" type="checkbox"/> Capillary fragility</li> <li><input checked="" type="checkbox"/> Weight loss</li> <li><input checked="" type="checkbox"/> Stomachic</li> </ul>
Lemon Peel فشر الليمون	<p>□ Dried rind of <i>Citrus limonis</i> family Rutaceae</p> <p>□ <i>Citrus</i> from citron tree</p> <p>□ <i>limonis</i> = lemon</p>	<ul style="list-style-type: none"> <li>➢ One row of schizodysigenous oil glands</li> <li>➢ KOH</li> <li>➢ Conc HCl</li> </ul> <p>Yellow colour no green colour</p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> V.O,</li> <li><input type="checkbox"/> Vit.C</li> <li><input type="checkbox"/> Flavonoids</li> <li><input checked="" type="checkbox"/> Common cold, carminative, cosmetics</li> </ul>
Silybum Marianum Milk Thistle الجوفف البري	<p>□ Dried ripe fruits of <i>Silybum marianum</i> F. compositae {Astraceae}</p> <p>□ Milk thistle = Milky leaves</p> <p>□ Silybum = edible thistle</p> <p>□ marianum from saint Mary</p>	<p>□ Flavolignans Silymarin, silybin)</p> <p>-----</p> <p>□ Hepatoprotective</p> <p>□ Digestive</p> <p>□ Antioxidant</p> <p>□ Anti-cancer</p> <p>□ Cholagogue</p>	

DRUG	ORIGIN	KEY ELEMENT, TEST	A.C , USES
<b>Vanilla pods</b> شمار الفانيليا	<ul style="list-style-type: none"> <li><input type="checkbox"/> Dried cured fruits of <i>Vanilla Planifolia</i> F. orchidaceae مثـل الـفـم الصـغـيرـة</li> <li><input type="checkbox"/> <i>Vanilla</i> = little pod</li> <li><input type="checkbox"/> <i>Planifolia</i> = flat-Leaved</li> <li><input type="checkbox"/> Orchidaceae = Orchid flowers</li> <li><input type="checkbox"/> Curing process converts the non-volatile glucovanillin and glucovanillic alcohol into vanillin (volatile)</li> </ul>	<ul style="list-style-type: none"> <li>➤ Test for V.O Sudan III RED</li> <li>➤ Adulterant: green vanilla pods with no odour no free vanillin</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Volatile oils {mainly Vanillin}</li> <li><input type="checkbox"/> Flavouring agent</li> <li><input type="checkbox"/> Antioxidant</li> </ul>
<b>Hops</b> حبـشـة الـبـدـار		<ul style="list-style-type: none"> <li><input type="checkbox"/> Dried strobiles of <i>Humulus Lupulus</i> F. Cannabinaceae</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> V.O {mainly humulene}</li> <li><input type="checkbox"/> Bitter Principles {Humulol and Lupulo}</li> </ul>
<b>Poppy capsule</b> كبسولة الخشنخاش		<ul style="list-style-type: none"> <li><input type="checkbox"/> Dried unripe but fully grown fruits of <i>Papaver somniferum</i> F. Papaveraceae</li> <li><input type="checkbox"/> <i>Papaver</i> = poppy = to swell</li> <li><input type="checkbox"/> <i>Somniferum</i> = bringing sleep كبسولة منتجة</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Opium Latex {morphine and codeine}</li> <li><input type="checkbox"/> Hypnotic,</li> <li><input type="checkbox"/> Narcotic analgesic</li> <li><input type="checkbox"/> (Causes respiratory depression on large dose)</li> </ul>

DRUG	ORIGIN	KEY ELEMENT, TEST	A.C , USES
<b>Hawthorn</b> <b>Hawthorn berry</b> زعور الأودية	<ul style="list-style-type: none"> <li><input type="checkbox"/> Dried fruits of <i>Crataegus monogyna</i> = <i>C. oxyacantha</i> Family Rosaceae</li> <li><input type="checkbox"/> <i>Crataegus</i> = Kratos = strengthened wood</li> <li><input type="checkbox"/> <i>monogyna</i> = uniseeded</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> <i>Cardiac insufficiency</i></li> <li><input type="checkbox"/> <i>Angina pectoris.</i></li> <li><input type="checkbox"/> <i>Arteriosclerosis.</i></li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Procyandins</li> <li><input type="checkbox"/> Flavonoids {Hyperosides}</li> <li><input type="checkbox"/> Amines (cardiotonic action).</li> <li><input type="checkbox"/> Catechins and epicatechins {Tannins}.</li> </ul>
<b>Wheat grains</b> جوب الفتح	<ul style="list-style-type: none"> <li><input type="checkbox"/> Dried ripe fruits of <i>Triticum sativum</i> and <i>Triticum vulgare</i> F. gramineae</li> </ul>	<ul style="list-style-type: none"> <li>► Rounded Shaped Starch, + Aleurone layer + non glandular unicellular hair with smooth cuticle</li> <li>► I<sub>2</sub> test for starch Blue colour</li> <li>► Picric acid for protein Yellow</li> <li>► Sudan III for fixed oils Red</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Starch</li> <li><input type="checkbox"/> Protein</li> <li><input type="checkbox"/> PUFA wheat germ oil from freshly grinded embryo</li> <li><input type="checkbox"/> VITE</li> <li><input type="checkbox"/> Bran (bulk fibers)</li> <li><input type="checkbox"/> Bran {Bulk laxative - Hemorrhoids}</li> <li><input type="checkbox"/> wheat germ oil {anti-anemic, Aging, threatened abortion}</li> </ul>
<b>Artichoke</b> الخرشوف			<ul style="list-style-type: none"> <li><input type="checkbox"/> Leaves and flowers of <i>Cynara scolymus</i> F. Asteraceae</li> </ul>